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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/748,919 | 12/27/2000 | Chikayoshi Kamata | 0941.65074 | 5081 |
| 24978 | 7590 | 12/09/2003 | EXAMINER | |
| GREER, BURNS & CRAIN 300 S WACKER DR 25TH FLOOR CHICAGO, IL 60606 | | | RENNER, CRAIG A | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2652 | 15 |

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------------------|------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/748,919 | KAMATA ET AL. | |
| | Examiner Craig A. Renner | Art Unit 2652 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 25 September 2003.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-7 and 13-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-7 and 13-19 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 27 December 2000 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) The translation of the foreign language provisional application has been received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include one or more reference signs not mentioned in the description. Note, for instance, "115" (shown twice in FIG. 3E, for instance) and "144" (shown in FIG. 3G, for instance). A proposed drawing correction, corrected drawings, and/or amendment to the specification are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 6-7, 13-16 and 18-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin et al. (US 6,185,078).

With respect to claims 1-4 and 6-7, Lin teaches a magneto-resistive magnetic sensor (200, for instance) comprising a magneto-resistive structure (includes 232, 234, 236 and 238) changing a resistance thereof in response to an external magnetic field, a cap layer (240), provided on a top surface of the magneto-resistive structure (as shown in FIG. 11, for instance); a pair of magnetic regions disposed at both lateral sides of the magneto-resistive structure (as shown in FIG. 11, for instance), the magnetic regions having a magnetization pointing in a common direction (due to each hard magnetic layer 252); a pair of electrodes (each 258) provided on the pair of magnetic regions so as to extend on a top surface of the magneto-resistive structure (as shown in FIG. 11, for instance) and so as to oppose each other across a central part of the magneto-resistive structure (as shown in FIG. 11, for instance), the electrodes having respective overhang parts extending over the magneto-resistive structure (as shown in FIG. 11, for instance) so as to oppose each other with a gap therebetween (as shown in FIG. 11, for instance), the pair of electrodes injecting a sensing current into the magneto-resistive structure primarily via the top surface of the magneto-resistive structure (as shown in

FIG. 11, for instance), wherein each of the overhang parts covers the cap layer on the magneto-resistive structure in such a state that an oxidation-resistant conductive layer (256) is interposed between the cap layer and the overhang part (as shown in FIG. 11, for instance) [as per claim 1]; wherein the oxidation-resistant conductive layer is formed of a metal selected from the group consisting of Au, Pt and Cu (as shown in FIG. 11, for instance) [as per claim 2]; wherein the oxidation-resistant conductive layer has a thickness larger than about 1 nm (line 11 in column 8, for instance) [as per claim 3]; wherein the oxidation-resistant conductive layer has a thickness of larger than about 3 nm (line 11 in column 8, for instance) [as per claim 4]; wherein the cap layer comprises Ta (as shown in FIG. 11, for instance) [as per claim 6]; and wherein the magneto-resistive structure comprises an anti-ferromagnetic pinning layer (238), a ferromagnetic pinned layer (236) having an exchange coupling with the anti-ferromagnetic pinning layer, a ferromagnetic free layer (232), and a non-magnetic separation layer (234) interposed between the ferromagnetic pinned layer and the ferromagnetic free layer (as shown in FIG. 11, for instance) [as per claim 7].

With respect to claims 13-16 and 18-19, Lin teaches a magneto-resistive magnetic sensor (200, for instance) comprising a magneto-resistive structure (includes 232, 234, 236 and 238) changing a resistance thereof in response to an external magnetic field, the magneto-resistive structure having a top surface and two tapered lateral sides (as shown in FIG. 11, for instance); a cap layer (240), provided on the top surface of the magneto-resistive structure (as shown in FIG. 11, for instance); a pair of magnetic regions disposed at both lateral sides of the magneto-resistive structure (as

shown in FIG. 11, for instance), the magnetic regions having a magnetization pointing in a common direction (due to each hard magnetic layer 252); a pair of electrodes (each 258) provided on the pair of magnetic regions so as to oppose each other across the magneto-resistive structure (as shown in FIG. 11, for instance), the electrodes having respective overhang parts extending over the magneto-resistive structure (as shown in FIG. 11, for instance) so as to oppose each other with a gap therebetween (as shown in FIG. 11, for instance), the pair of electrodes injecting a sensing current into the magneto-resistive structure primarily via the top surface of the magneto-resistive structure (as shown in FIG. 11, for instance), wherein each of the overhang parts covers the cap layer on the magneto-resistive structure in such a state that an oxidation-resistant conductive layer (256) is interposed between the cap layer and the overhang part (as shown in FIG. 11, for instance) [as per claim 13]; wherein the oxidation-resistant conductive layer is formed of a metal selected from the group consisting of Au, Pt and Cu (as shown in FIG. 11, for instance) [as per claim 14]; wherein the oxidation-resistant conductive layer has a thickness larger than about 1 nm (line 11 in column 8, for instance) [as per claim 15]; wherein the oxidation-resistant conductive layer has a thickness of larger than about 3 nm (line 11 in column 8, for instance) [as per claim 16]; wherein the cap layer comprises Ta (as shown in FIG. 11, for instance) [as per claim 18]; and wherein the magneto-resistive structure comprises an anti-ferromagnetic pinning layer (238), a ferromagnetic pinned layer (236) having an exchange coupling with the anti-ferromagnetic pinning layer, a ferromagnetic free layer (232), and a non-

magnetic separation layer (234) interposed between the ferromagnetic pinned layer and the ferromagnetic free layer (as shown in FIG. 11, for instance) [as per claim 19].

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 5 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,185,078).

Lin teaches the magneto-resistive magnetic sensor as detailed in paragraph 5, supra. Lin, however, remains silent as to the oxidation-resistant conductive layer thickness being “smaller than about 10 nm.”

Official notice is taken of the fact that it is notoriously old and well known in the magneto-resistive magnetic sensor art to modify the parameters of magneto-resistive magnetic sensor components during the course of routine optimization/experimentation.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have had the oxidation-resistant conductive layer thickness of Lin be smaller than about 10 nm. The rationale is as follows:

One of ordinary skill in the art would have been motivated to have had the oxidation-resistant conductive layer thickness of Lin be smaller than about 10 nm since such a range, absent any criticality (i.e., unobvious and/or unexpected result(s)), is generally achievable through routine optimization/experimentation, and since discovering the optimum or workable ranges, where the general conditions of a claim are disclosed in the prior art, involves only routine skill in the art, *In re Aller*, 105 USPQ 233 (CCPA 1955). Moreover, in the absence of any criticality (i.e., unobvious and/or unexpected result(s)), the parameter set forth above would have been obvious to a person having ordinary skill in the art at the time the invention was made, *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig A. Renner whose telephone number is (703) 308-0559. The examiner can normally be reached on Tuesday-Friday 7:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.



Craig A. Renner
Primary Examiner
Art Unit 2652

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